REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 112-130 are presently active in this case; Claims 1-111 previously canceled, Claims 112, 113, 120-122, and 126 having been amended; and Claims 129 and 130 added by way of the present amendment.

In the outstanding Office Action, a Supplemental Declaration was requested; the Abstract of the Disclosure was objected to; Claim 120 was rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; Claims 112-128 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite; Claims 112-128 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,847,111 to Chow et al. singly or with Park et al.; Claims 115, 123 and 127 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chow singly or with Park, and further in view of Hatano et al.; Claim 117 is rejected under 35 U.S.C. §103(a) as being unpatentable over Chow singly or with Park and further in view of Buyn et al.; Claim 120 is rejected under 35 U.S.C. §103(a) as being unpatentable over Chow singly or with Park and further in view of Park and Fleming et al.; Claim 122 is rejected under 35 U.S.C. §103(a) as being unpatentable over Chow singly or with Park and further in view of Yelverton et al.

In response to the request for a Supplemental Declaration, submitted herewith is an executed Supplemental Declaration.

In response to the rejection under 35 U.S.C. §112, first paragraph, Applicants respectfully submit that a process to form a film containing tungsten made of WNx or WSixNy by supplying WF_6 an SiH_4 is supported by the specification as originally filed. Specifically, this feature is disclosed in Applicants' specification at page 15, line 24 – page 17, line 3. Thus, Applicants request that the rejection of Claim 120 under 35 U.S.C. §112, first paragraph, be withdrawn.

In response to the rejection under 35 U.S.C. § 112, second paragraph, Claim 112, 113, 120-122 and 126 are amended to correct the noted informalities. Therefore, the rejection under 35 U.S.C. § 112, second paragraph, is believed to be overcome and no further rejection on this basis is anticipated. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work with the Examiner in a joint effort to derive mutually satisfactory claim language.

Turning now to the merits, a feature of the present invention is that a hard-to-remove side reaction product of the reaction of the residue of the fluorine, etc. used to form a film containing tungsten is prevented from being formed at the time N_2 or NH_3 is supplied into the process vessel for nitriding.[1] In order to prevent the formation of the side reaction product, the residue is removed from the chamber. Thus, in the present invention, "shutting off" and "removing" are performed after the formation of a film containing tungsten. This "removing" is achieved by purging gas such as N_2 gas or an inert gas. By "purging gas," the removal of

1 See Applicants' specification at p. 20, line 18 – p. 21, line 3.

the residue from the film formation can be surely achieved, in a simple process. "Purging" is a process in which purging gas is caused to continuously flow through the process vessel.

In order to expedite issuance of a patent in this case, Applicants have now amended Claims 112, 121 and 126 to clarify the patentable features of the present invention over the cited references. Specifically, these claims have been amended to recite a method of forming a barrier metal film formed of a nitride film including tungsten by thermal CVD. The method includes positioning a substrate in a processing vessel, maintaining a pressure in the processing vessel, and forming a film containing tungsten on one side of the substrate by supplying a process gas into the processing vessel. Also recited is shutting off the supplying of the process gas into the processing vessel and removing the process gas from the processing vessel by supplying a purging gas into the processing vessel while evacuating the processing vessel. Nitriding of the film containing tungsten is then performed by supplying NH_3 gas.

In contrast, Chow et al. does not disclose removing a gas from the processing vessel by supplying a purging gas into the vessel while evacuating the processing vessel. In this regard, lines 43-45 of column 3 of Chow et al. states "It should be noted that prior to introduction of the nitrogen gas for nitridation, the reactor chamber could be backfill flushed with argon, but such additional step would increase processing time." However, the description does not indicate the purpose of performing backfill. Although it is uncertain because it is not described concretely, "backfill" appears to be a process in which gas is filled into the vessel, not a process in which gas is caused to continuously flow through the vessel

such as with the purging step claimed in each of Claims 112, 121, and 126. Moreover, it is mentioned in the reference that this additional step increases the processing time. Applicants believe this is because the step is added to the "evacuation step" described in line 4 of column 3 of Chow et al. It appears that in this reference, the residue is removed in the "evacuation step." This is in agreement with the description of Park et al. pointed out by the Official Action. It is virtually impossible to remove the residue completely by evacuation, and moreover, time is required. As is clear from the specification, in the present invention, evacuation is not used in removing the residue. Rather, a purging gas is used as now clearly recited in Claims 112, 121, and 126. Thus, Applicants' Claims 112, 121 and 126 patentably define over Chow et al. and Park et al.

In addition, Park et al does not disclose the use of NH_3. If "nitriding" is performed using N_2 gas, it is necessary to form plasma, as stated in the reference and claim 126 of the present application. However, if NH_3 gas is used as recited in claims 112 and 121 of the present application, it is unnecessary to form plasma. This provides an additional reason for patentability of Claims 112 and 121.

Finally, Applicants note that the secondary references to Hatano et al., Buyn et al., Fleming et al., and Yelverton et al. were cited in the Official Action for teaching limitations of the dependent claims and do not correct the deficiencies of Chow et al. and Park et al. noted above. Therefore, as Claims 113-120, 122-125 and 127-130 depend from the independent claims distinguished above, these dependent claims also patentably define over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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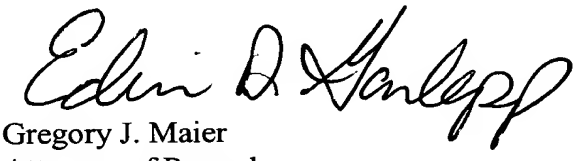

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